

Measuring Visual Acuity

INTRODUCTION

Five complex functions of the human eye comprise visual acuity, visual field, contrast sensitivity, colour perception and image formation. To identify the actual cause of poor vision, ophthalmologists apply a number of methods to determine the visual acuity of a patient. Technicians, therefore, play an important role to test and determine accurate visual acuity of a person. It is important to measure visual acuity, record and document the findings for further reference.

This unit will give the students an insight into visual acuity, how to measure it, the normal vision, and its significance to record visual acuity. They will learn to describe the relation between visual acuity and refractive errors. The students will also be able to record visual acuity for distant and nearby vision. This unit will cover vision related abbreviations being used in the prescriptions and case paper of eye patients.

After studying this unit you will learn about:

- The importance to measure visual acuity
- How visual acuity is to be measured
- When and why should vision be retested with a pinhole
- How to record visual acuity

Did you know?

Snellen chart was developed by Dutch ophthalmologist Herman Snellen in 1862 and thus is named after him.

SESSION 1: MEANING OF VISUAL ACUITY

In this session, you will learn about the reasons to measure visual acuity. Visual acuity is the angular measurement of the amount of clarity that a person has with his vision in relation to an object of a particular size at a particular distance. Low visual acuity is an obstacle in the day-to-day life. This visual assessment can help to identify errors of refraction, other ocular diseases and optical disorders. Visual acuity is evaluated before and after the correction of error of refraction for far and near distances for each eye.

Reasons to measure visual acuity

Relationship between measure of visual acuity and refractive error

Refractive error is defined as ametropia. This error occurs due to faulty refraction in the eyeball, which may be due to the abnormal size of the eyeball, uneven curvature of cornea or flexibility of the eye of lens. A very high or very low refractive error would cause myopia (near-sightedness), or hypermetropia (far-sightedness). The state of normal refractive status is termed as emmetropia.

Practical Exercise

Visit a vision care clinic to observe the methods used to measure visual acuity for far and near distances.

Check Your Progress

A. Fill in the blanks

1. Refractive error is defined as _____.
2. A very high or low refractive error would cause _____ or _____.

B. Short answer questions (30-40 words)

1. What is visual acuity? And how is it measured?
2. What is the connection between error of refraction and visual acuity?



SESSION 2: PROCESS OF MEASURING VISUAL ACUITY

In this session, you will learn about the Snellen chart and its benefits.

Visual acuity or VA is tested and measured by asking the patient to identify images or read letters on a chart. Black letters or symbols against white on a chart represent extreme contrast. This helps the vision technician to measure a patient's acuity of vision. The tests to record visual acuity include Snellen chart and E-test. There are also tests to check acuity for near distances. The visual acuity distance is usually measured at six metres or 20 feet. A suitable test distance is obtained by using mirrors and a reflective system when the examination distance is lesser than 20 feet.

Snellen chart

VA is considered normal when it is recorded as 20/20 by the Snellen chart. In case the patient fails to read at all, he is called for further testing (Fig.4.1).

E-test

This is used to test the VA of pre-school as well as older children. The test is known as the illiterate E-test or the E-game (Fig. 4.2). Sometimes, other letters, numbers or symbols are also used. When the children are tested with the E-game, they are asked to point towards the E with their hands or finger. This test may be tough to use as children are often confused between right and left or due to differences at the stages of development, even if they may have good vision acuity.

Conventionally, the first visual acuity test is done in the right eye, followed by the left eye. Hence, a patch or an occluder is used while testing the VA in each eye. Using



Fig. 4.1: Snellen Chart

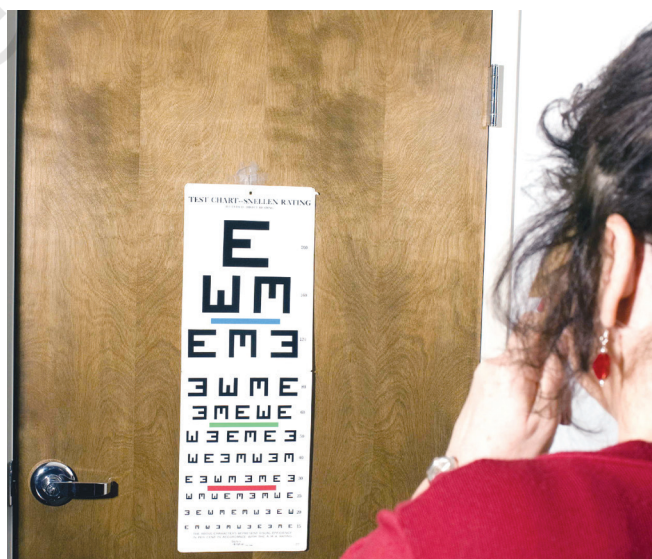


Fig. 4.2: E-test



Fig. 4.3: Test for Near Vision

an adhesive patch can be a good occluder. The line where the patient can read the maximum number of small letters is recorded.

Tests for near vision (Fig.4.3) are used to identify a person's ability to see near objects clearly. Hence, a near vision test is necessary to identify whether a person requires spectacles or another device to have clear vision at near distances. Near tasks include activities, such as eating, art and craft work, personal care and hygiene activities, reading, and some other work tasks. A number of methods are available to test the near vision. Jaegar's test is commonly used to test near vision. Reading cards are specifically used for testing near vision acuity.

Practical Exercises

1. Visit a vision care clinic and observe the method of measurement of visual acuity.
2. A young man has some problem in the eye. He needs to go to a vision technician. What is the first test that the vision technician will do? Mention the reason behind this.

Check Your Progress

A. Fill in the blanks

1. The visual acuity for distance is usually measured at a distance of _____ metres.
2. A patch or _____ is used while testing the VA.

B. Short answer questions (30-40 words)

1. What is the distance between a patient and the Snellen chart?
2. What is the Snellen chart?



SESSION 3: NORMAL VISION AND KEEPING RECORD OF VISUAL ACUITY

In this session, you will understand normal vision and the simple, effective method of stating visual acuity.

Eyes of every individual are uniquely different and so is their vision. Therefore, it is important to understand normal vision first. Normal vision is often described as a 20/20 vision (feet equivalent to 6 metres). Other important skills of vision are eye coordination, peripheral field, ability to focus, perception of depth, and colour vision which play an equally important role in determining visual acuity. Thus, it becomes important to also check the physiological health of various components of the eye.

Visual acuity measures the vision of a person. The purpose of examination of the eye is to identify the most suitable prescription of glasses to provide visual correction. On understanding normal vision, a person will have a clear understanding of the terms near-sightedness, far-sightedness, astigmatism, or blurriness due to age.

Nearsightedness or **myopia** is a condition when the patients can clearly see the objects that are close by, while the objects that are far away are blurred. The treatment for this condition is using corrective lenses like contact lenses or eyeglasses for better vision, or taking the help of refractive surgery.

Far-sightedness is another clinical condition of the eye, medically known as **hyperopia**, where the patient can see the objects at a distance quite clearly, but has a hazy vision of the objects that are closer. It is treated with contact lens, refractive surgery or by using eyeglasses for correction.

Astigmatism is another clinical condition of the eye where the curvature of the cornea is uneven, which creates difficulty for the eye to have a clear vision. This eye condition generally supplements either with far-sightedness or near-sightedness.

Presbyopia due to age is a common problem faced by people as they near the age of 40 years. A major section of people start holding their favourite reading

Did you know?

Treatment for astigmatism includes the use of refractive surgery or corrective lenses, addressing the irregular curvature of the cornea.



materials at convenient distances so as to see clearly, but have to strain to see, though they are able to see quite clearly the objects that are faraway. This clinical condition of the eye which is age related, is medically known as **presbyopia**, which actually starts around the age of 40 years, and continues over the years, though major changes can be noticed at a much later stage. This condition of the eye can be treated by using corrective lens or by refractive surgery.

PERSONAL DETAILS				
Name:				
School/Organisation/Clinic:				
Age:				
Gender:	<input type="checkbox"/> Male <input type="checkbox"/> Female			
VISUAL ACUITY		Right	Left	Both
Distance				
presenting (without glasses)				
corrected (with glasses)				
Near				
both eyes (with glasses if used) _____ at a distance of _____ cm				
REMARKS (Complaints, previous treatment/operations, observation)				
Name of Tester: _____				
Date: _____				

Fig. 4.4: Visual acuity record

In the previous sessions, discussions were carried out on a vision technician's ability to measure the patients' visual ability, the relationship of visual acuity and refractive error and various kinds of tests assessing visual acuity have been discussed in this session (Fig. 4.4). The importance of recording visual acuity. Here, it is necessary to differentiate between *visual functions* and *functional vision*, first. In this context, it must be understood clearly that visual functions denote the way the eye functions, and functional vision indicates the functional aspect of a person in his or her daily life.

Practical Exercises

1. Visit an eye unit or clinic to observe the methods to record vision and also observe the management of other refractive conditions.
2. Visit a nearby vision care clinic and observe how they are recording visual acuity (Use additional sheets of paper if necessary).

Check Your Progress

A. Short answer questions (30–40 words)

1. What is 20/20 vision? What is the difference between 20/10 visions?
2. Is 20/40 correct vision? Justify your answer.



3. List some names of eye diseases.
4. What is the difference between near-sightedness and far-sightedness?
5. What is myopia?
6. What is presbyopia?
7. What is the importance of recording visual acuity?
8. How should visual acuity be recorded?

B. Write short notes on the following:

1. Visual Acuity
2. Near Vision

Some Important Abbreviations	
VA	Visual Acuity
c.c.	With correction
s.c.	Without correction
N	Near
D	Distance
PH	Pinhole
OD or RE	Right Eye
OS or LE	Left Eye
OU	Both eyes (together)
J	Jaeger notation
CF or FC	Count Fingers or Finger Counting
HM	Hand Motion
LP	Light Perception
NLP	No Light Perception
F/FFix/	Follow
20/40-2	Missed two letters on the 20/40 line
20/50+2	Read 2 letters on the line following the 20/50 line+ Entopic response
LP c pro	Light Perception with Projection

